

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

CRIMINAL NO. 22-CR-20504

v.

HON. JONATHAN J.C. GREY

AWS MOHAMMED NASER,

Defendant.

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**GOVERNMENT'S RESPONSE OPPOSING EXCLUSION OF  
EXPERT WITNESS TESTIMONY ON EXPLOSIVES**

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Naser misrepresents the significance of the density measurements performed by the government expert. Building on a false premise, Naser challenges the reliability of the scientific methods used by the FBI's chemist in analyzing the hydrogen peroxide found in Naser's possession, and moves to exclude not only the chemist's testimony, but the testimony of the FBI's bomb expert. Naser also questions the relevance of the chemist's testimony and needlessly asks the court for a *Daubert* hearing.

The measurement of a liquid's density using an analytical balance or scale, as was done here, is a valid scientific technique. It is recognized

as an efficient way to reliably approximate the concentration of any liquid, to include hydrogen peroxide.<sup>1</sup> The government's experts are well-qualified, and they examined the evidence using well-established and reliable scientific techniques. Their methods, conclusions, and opinions meet the threshold requirements for admission under Fed. R. Evid. 702.

And their testimony is not only relevant under Fed. R. Evid. 104, but is highly probative of the essential elements of the charged offenses. The experts' scientific, technical, and specialized knowledge will help the jury understand the evidence and determine whether Naser possessed a destructive device. Naser's challenge to their testimony is baseless, and his motion should be denied without a hearing.

### Factual Background

During a search of Naser's basement on October 30, 2017, FBI Special Agent Bomb Technicians seized chemicals which were submitted for analysis to the FBI's Explosives Unit within the Terrorist Explosives

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<sup>1</sup> The analytical balance used to calculate the density of the hydrogen peroxide in this case is accurate to within 0.001g, or 1 milligram. The "approximate" concentration calculation is not guesswork or speculation. It is, in fact, a concrete and reliable estimate based on mass measurements with an error rate of within 0.001g.

Device Analytical Center (TEDAC). The FBI's Laboratory Division is one of the largest and most comprehensive crime labs in the world. Its chemistry division, in particular, is one of the best forensic chemistry laboratories in the world. This is in part because the lab meets international accreditation standards, and because their work is subjected to a rigorous peer review process in which all examinations and opinions are independently reviewed by another subject matter expert. Using widely accepted scientific methods, FBI Supervisory Chemist Raleigh Parrott II analyzed these items and found they contained acetone, sulfuric acid, and hydrogen peroxide (Item 8).

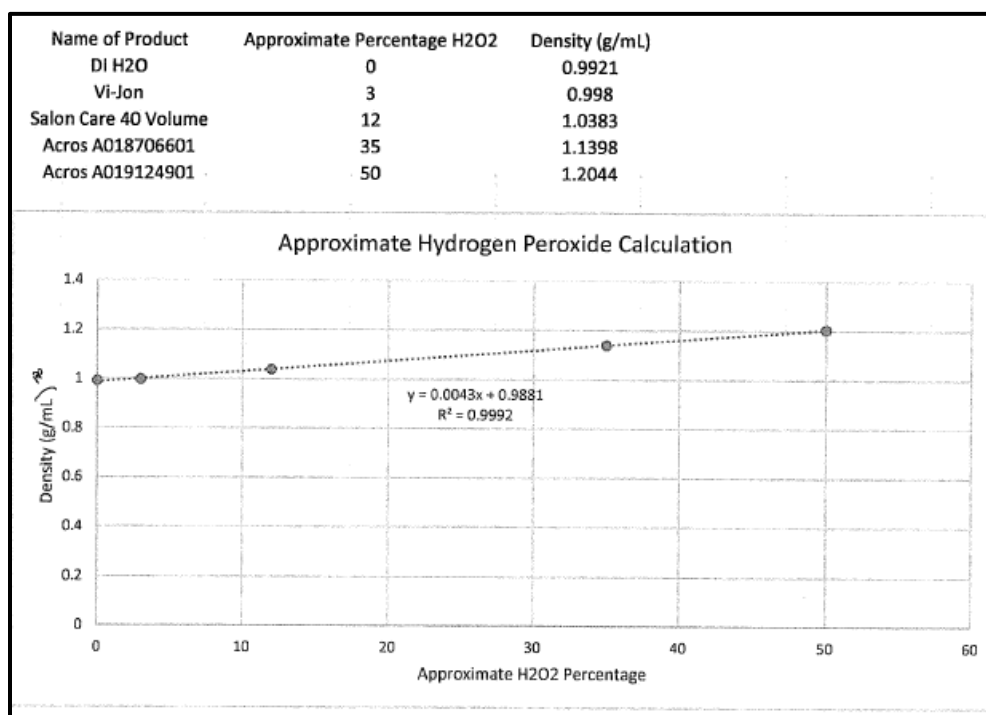
Mr. Parrott performed two tests on Item 8—Raman Spectroscopy and a peroxide test strip before concluding the sample contained hydrogen peroxide ( $\text{H}_2\text{O}_2$ ). Mr. Parrott then measured the density of the hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) using an analytical balance. The use of density measurements to calculate  $\text{H}_2\text{O}_2$  is basic science. FBI chemists routinely perform density by weight tests on all water containing liquids, effectively weighing it on a scale. Data correlating the density of  $\text{H}_2\text{O}_2$  to approximate concentration levels has reliably been used and reported since at least the 1950s. *See* Schumb, W.C., Satterfield, C.N., Wentworth,

R.L.; “Hydrogen Peroxide,” Reinhold Publishing, 1955. The H<sub>2</sub>O<sub>2</sub> sample contained within Item 8 weighed 1.0620 g/mL. Using the same analytical balance, on the same day, in the same environmental conditions, Mr. Parrott recorded the density measurements for reference materials of H<sub>2</sub>O<sub>2</sub> that were available to him. (See Figure 1). Mr. Parrott then calculated that the concentration of H<sub>2</sub>O<sub>2</sub> within Item 8 was between 12% and 17%.

Notably, these measurements fall within the limits of the published data for hydrogen peroxide at or near room temperature conditions (25C/77F). (See Figure 2; Exhibit 1: Schumb Table).

*Mr. Parrott's Case Notes*

Figure 1



*Published Data (at 25C) – Schumb*

Figure 2

H <sub>2</sub> O <sub>2</sub> Concentration	Density
0%	0.9971 g/mL
5%	1.0145 g/mL
10%	1.0324 g/mL
15%	1.0507 g/mL
20%	1.0694 g/mL

In his handwritten case notes, beneath his calculations, Mr. Parrott noted that he did not perform tests to determine the precise concentration of the sample (*See Sealed Exhibit 2: Parrott Case Notes*). Such precision is often necessary, for instance, to ensure proper sterilization of machinery used by pharmaceutical companies in the manufacture of medications. In those instances, methods for ascertaining precise concentrations require validation, a term of art within the scientific community:

‘Method validation’ is a term used for the suite of procedures to which an analytical method is subjected to provide objective evidence that the method, if used in the manner specified, will produce results that conform to the statement of the method validation parameters.

Like many aspects of quality assurance, method validation is of a relative nature. As with the concept of fitness for purpose, a method is validated for a particular use under particular circumstances. If those circumstances vary, then the method would need to be re-validated at least for the differences.

Hibbert, D Brynn, "Method Validation", Quality Assurance in the Analytical Chemistry Laboratory (NY, 2007; online edn, Oxford Academic, 12 Nov. 2020). <https://doi.org/10.1093/oso/9780195162127.003.0012>

There are at least three scientific methods for calculating the concentration of  $\text{H}_2\text{O}_2$  within an aqueous solution: analytical balance measurements, Titration, and Ion Chromatography. Exact concentration can only be obtained with the latter two methods, which require specialized equipment. Like all machinery, this equipment is susceptible to variations in performance that can occur based on the manufacturer, the age of the equipment, and its maintenance record. Additional variations in testing are attributed to the individual scientists who conduct the examinations. As a result, before Titration and Ion Chromatography tests can be performed, the scientist and laboratory conducting the test must first develop a validated quantitative method that is specific to each piece of equipment and scientist that is performing the test. Larger volumes of the test sample are required when validating

the method because the chemist must perform multiple tests to remove the variables. Each test destroys the sample, and additional samples are used until a reliable test is developed that provides a precise result.

This type of exact quantification is not required when manufacturing TATP. This is because TATP—triacetone triperoxide—is the product of a chemical reaction that occurs when acetone and hydrogen peroxide molecules collide. Varying concentrations and quantities of these chemicals can affect, for instance, the speed of the reaction and the quantity of TATP produced.

This point is well illustrated in the TATP bombmaking instructional video published by the Ibn-Taymiyyah Media Center (ITMC) that Naser downloaded, viewed, and then deleted in this case. The video's narrator begins his instruction with the statements: "Hydrogen peroxide is sold at pharmacies as a sterilizer. Due to the concentration of the substance being at 3%, it is boiled using gentle heat until it reaches one tenth of that amount." (See Sealed Exhibit 3: English translation of the ITMC video). Aspiring bombmakers are then instructed to begin with 400 milliliters (approximately 13.53 ounces) of hydrogen peroxide and to heat the  $\text{H}_2\text{O}_2$  "in a glass or stainless [steel] container, on

gentle heat until the water evaporates, and only 40 milliliters [approximately 1.35 ounces] are left.” Id. Precise concentrations of hydrogen peroxide are not referenced or required.

Mr. Parrott’s footnote does not state—nor can it reasonably be interpreted to mean as Naser absurdly suggests—that the scientific density measurement technique he performed is invalid, speculative, theoretical, unvalidated,<sup>2</sup> unreliable, or otherwise unscientific. Measuring a liquid’s density to estimate concentration has long been recognized within the scientific community as an efficient, reliable, and valid scientific technique.

In addition, and contrary to Naser’s assertions, Mr. Parrott did not render an opinion regarding the exact quantities or concentrations of chemicals found in Naser possession. (Def. Br. at PgID.3028). His report concluded:

1) that he identified acetone in Item 5; an aqueous solution of sulfuric acid in Item 7; and an aqueous solution of hydrogen peroxide in Item 8;

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<sup>2</sup> The FBI Laboratory’s analytical balance and pipettes are calibrated annually by an external accredited company. This calibration of the equipment validates the technique.



2) that acetone, hydrogen peroxide, and a strong acid (such as sulfuric acid) can be utilized to synthesize the primary high explosive triacetone triperoxide (TATP); and

3) “Assuming full containers of the sulfuric acid (940mL), acetone (2 x 296mL), and hydrogen peroxide (197mL), the maximum theoretical yield of TATP would be between 54g and 77g.”

(See Exhibit 4: Sealed Laboratory Report, p.1)

Mr. Parrott’s report clarified that his conclusion regarding the “theoretical range is dependent upon the approximate concentration and volumes for the acetone and hydrogen peroxide.” Id. Mr. Parrott’s notes detail his density calculations. His density calculation is not speculative or guesswork, but a concrete and reliable estimate based on mass measurements.

Density measurements provide reliable data from which theoretical yields can be scientifically approximated. Another scientific term of art, the “theoretical yield” is the quantity of a product obtained from the complete conversion of the limiting reactant in a chemical reaction. It is the amount of product resulting from a perfect (theoretical) chemical reaction.

The amount of product that *may* be produced by a reaction under specified conditions, as calculated per the stoichiometry of an appropriate balanced chemical equation, it is called the **theoretical yield** of the

reaction. In practice, the amount of product obtained is called the **actual yield**, and it is often less than the theoretical yield for a number of reasons.

Flowers, P., Theopold, K. et al., “Reaction Yields” Chemistry 2e (2019, online edn, Rice University, 24 Jan. 2025).  
<https://openstax.org/books/chemistry/pages/4-4-reaction-yields>.

Mr. Parrott rendered an opinion about how much TATP *could* be manufactured with specified quantities of acetone, sulfuric acid, and H<sub>2</sub>O<sub>2</sub> at different concentrations under the circumstances specified in his report. The minimum and maximum concentration range of 12% to 17% Mr. Parrott provided accounts for any potential variation in the density calculation. Relying upon these findings, Mr. Parrott provided an opinion regarding the amount of TATP that *could* have been produced—approximately between 54 and 77 grams—had the containers Naser possessed been full.

### Law and Argument

“For expert testimony to be admissible, the court must find the expert to be (1) qualified; (2) her testimony to be relevant; and (3) her testimony to be reliable.” *United States v. LaVictor*, 848 F.3d 428, 441 (6th Cir. 2017) (citing *Daubert Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 589 (1993)). *Daubert’s* “gatekeeping role” requires trial judges

to “strike a balance between a liberal admissibility standard for relevant evidence on the one hand and the need to exclude misleading ‘junk science’ on the other.” *LaVictor*, 848 F.3d at 441 (internal citations omitted).

a. *A Daubert Hearing is Unnecessary.*

Density measurements of H<sub>2</sub>O<sub>2</sub> are not “junk science.” “[A] district court can comply with *Daubert* without holding a hearing.” *United States v. Taylor*, 643 F.Supp.3d 731, 743 (E.D. Ky. 2022) (citing *Nelson v. Tennessee Gas Pipeline Co.*, 243 F.3d 244, 249 (6th Cir. 2001) (“we have stated that the district court is not required to hold an actual hearing to comply with *Daubert*”)). “The trial court must have the same kind of latitude in deciding *how* to test an expert’s reliability, and to decide whether or when special briefing or other proceedings are needed to investigate reliability, as it enjoys when it decides *whether or not* that expert’s relevant testimony is reliable.” *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999) (emphasis in original).

A trial court’s decision *not* to hold a Daubert hearing is appropriate when the court has an adequate basis to determine the reliability and validity of the expert’s opinions. *Nelson*, 243 F.3d at 249; *In re Scrap*

*Metal Antitrust Litig.*, 527 F.3d 517, 532 (6th Cir. 2008) (holding that the district court did not abuse its discretion when “the record on the expert testimony was extensive, and the *Daubert* issue was fully briefed by the parties”).

In this case, Naser’s challenge to the reliability of the tests performed by Mr. Parrott is based solely on his supposition that because Mr. Parrott did not use a “validated quantitative method,” then the density test he did perform must therefore, *ipso facto*, be invalid. Naser’s logic is flawed, and his assumptions are unsubstantiated. Even if a validated quantitative method was utilized, identifying the precise concentration of H<sub>2</sub>O<sub>2</sub> would not affect, undermine, or negate the scientific conclusion that the H<sub>2</sub>O<sub>2</sub> found in Naser’s possession could have been used to successfully manufacture TATP. A hearing is not necessary to resolve this issue.

b. The Government’s Experts are Well Qualified.

Although Naser does not challenge the qualifications of the government’s experts, Raleigh Parrott and Christopher Rigopoulos are both exceptionally well qualified experts. As demonstrated by their curriculum vitae, both witnesses possess the requisite knowledge, skill,

training, experience, and education in their respective fields of expertise to help the jury to understand the evidence and determine whether Naser possessed a destructive device. (Sealed Exhibits 5 and 6, Curriculum Vitae: Raleigh Parrott and Christopher Rigopoulos).

Mr. Parrott is a chemist with extensive experience in explosives chemistry who has testified at least eight times since 2015 as an expert in explosives chemistry. Mr. Rigopoulos, who retired from the FBI in 2021, has vast experience in the forensic exploitation of improvised explosive devices (IEDs) and he has testified in state and federal courts many times as an as an expert in this field of explosives. Both witnesses have significant field and operational experience and have served as instructors throughout the United States and in Mr. Rigopoulos experience, internationally.

c. Expert Testimony is Highly Relevant to Prove Facts in Issue.

Their testimony is highly relevant to assist the jury in determining whether the government has proved all charged counts, and in particular, an element of the felon in possession of a firearm count which is alleged in this case to be a destructive device. Their testimony explains how the items in Naser's possession on October 30, 2017, are

components—a main explosive charge, precursor chemicals of a main explosive charge, main charge containers, and components for an electrical fusing system—which, if properly assembled, comprise an improvised explosive device (IED), also known as a destructive device or homemade bomb.

d. The Expert Testimony is Reliable.

*Daubert* identified four non-exhaustive factors for courts to consider: (1) whether the expert’s methodology can and has been tested; (2) whether it has been subjected to peer review and publication; (3) what its known or potential rate of error is and the existence of standards controlling the technique's operation, and whether standards controlling its operation exist; and (4) whether the methodology or technique employed is generally accepted in the field. *Daubert*, 509 U.S. at 592-94.

When determining whether the testimony is reliable, courts are encouraged to assess whether the testimony is the “product of reliable principles and methods,” whether the expert “has applied the principles and methods reliably to the facts of the case,” and whether the testimony is based on “sufficient facts or data.” *In re Scrap Metal Antitrust Litig.*, 527 F.3d at 529-530, quoting Fed. R. Evid. 702. Reliability assessments

should be focused on the foundation of the opinion, “as opposed to say, unsupported speculation.” 527 F.3d at 530.

The test of reliability is “flexible,” and the *Daubert* factors do not constitute a “definitive checklist or test,” but may be tailored to the facts of a particular case. *Kumho Tire Co.*, 526 U.S. at 150 (citing *Daubert*, 509 U.S. at 593). Indeed, we have recognized that the *Daubert* factors “are not dispositive in every case” and should be applied only “where they are reasonable measures of the reliability of expert testimony.” *Gross v. Comm’r*, 272 F.3d 333, 339 (6th Cir.2001).

Here, Mr. Parrott used basic chemistry principles and methods—not junk science—when concluding Item 8 contained an aqueous solution of hydrogen peroxide with a concentration of between 12%-17%. His conclusions were peer-reviewed, and his findings are fully documented in his laboratory report, case notes, and related materials.

Mr. Parrott first examined Item 8 macroscopically and described the sample as containing a “clear liquid.” Next, he analyzed the sample using Raman Spectroscopy, which showed Item 8 contained Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>). Raman Spectroscopy is a non-destructive chemical analysis technique that uses a laser to provide detailed information about

the chemical structures and, in essence, provides a fingerprint to identify molecules. The technique was discovered in the 1930s, and the test remains one of the preferred methods for reliably investigating and identifying chemical properties of aqueous solutions. (See Exhibit 7: VENKATESWARAN, S. Raman Spectrum of Hydrogen Peroxide. *Nature* 127, 406 (1931) and Exhibit 8: *Water Research*. Pergamon Press (1970), Vol. 4, pp. 125-128).

Next, Mr. Parrott confirmed the Raman Spectroscopy results by testing Item 8 with a peroxide test strip, which reliably measures the residual concentration of hydrogen peroxide in a solution. The strip tested positive.

Mr. Parrott then conducted a density measurement to determine the concentration of  $\text{H}_2\text{O}_2$  in the sample. Density measurements, which have been used for nearly a century, are used to reliably estimate the concentration of hydrogen peroxide within a solution. Mr. Parrott's notes detail his scientific measurements, and his report approximates the theoretical yield of TATP. Finally, Mr. Parrott findings were submitted for peer review.



Mr. Parrott's conclusions are based on well recognized and reliable scientific methods which present no novel issues warranting an evidentiary hearing. Naser's concerns regarding the methodology used by Mr. Parrott are properly addressed through vigorous cross-examination or through the testimony of his own experts. *Daubert*, 509 U.S. at 596 ("Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.")

Mr. Parrott's conclusions fulfill the relevancy and admissibility requirements of Fed. R. Evid. 104 and 702, and Naser's motion to exclude his testimony should be denied. Likewise, Naser's challenge to the testimony of the government's explosives expert, Christopher Rigopoulos, is also without merit, and should be denied.

## **CONCLUSION**

For the reasons set forth above, the United States respectfully requests that Naser's motion to exclude or limit the expert testimony of FBI Supervisory Chemist Raleigh Parrott II and retired FBI Supervisory Special Agent Bomb Technician Christopher Rigopoulos, be denied without a *Daubert* hearing.

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